99A-114

PSP Cover Sheet

Proposal Title:	Colusa Basin Drain Adult Salmonid Barrier Project
Applicant Name:	Surface Water Resources, Inc.
Mailing Address:	455 Capitol Mall, Suite 600, Sacramento, CA 95814
Telephone:	(916) 325-4050
Fax:	(916) 446-0143
Email:	main@swri.net

Amount of funding requested: $577,500 for 3 years

Indicate the topic for which you are applying (check only one box).

- ☒ Fish Passage/Fish Screens
- ☐ Habitat Restoration
- ☐ Local Watershed Stewardship
- ☐ Water Quality
- ☐ Introduced Species
- ☐ Fish Management/Hatchery
- ☐ Environmental Education

Does the proposal address a specified Focused Action? ____yes ___✓__no

What county or counties is the project located in? Yolo County

Indicate the geographic area of your proposal (check only one box).

- ☒ Sacramento River Mainstem
- ☐ Sacramento Trib: _____
- ☐ San Joaquin River Mainstem
- ☐ San Joaquin Trib: _____
- ☐ Delta: _____
- ☐ East Side Trib: _____
- ☐ Suisun Marsh and Bay
- ☐ North Bay/South Bay: _____
- ☐ Landscape (entire Bay-Delta watershed)
- ☐ Other: _____

Indicate primary species which the proposal addresses (check all that apply)

- ☐ San Joaquin and East Side Delta tributaries fall-run chinook salmon
- ☒ Winter-run chinook salmon
- ☒ Late-fall run chinook salmon
- ☐ Delta smelt
- ☐ Splittail
- ☐ Green sturgeon
- ☐ Migratory birds
- ☐ Other: _____
- ☒ Spring-run chinook salmon
- ☒ Fall-run chinook salmon
- ☐ Longfin smelt
- ☐ Steelhead trout
- ☐ Striped bass
- ☐ All chinook species
- ☐ All anadromous salmonids

Specify the ERP strategic objective and target(s) that the project addresses. Include page numbers from February 1999 version of ERPP Volumes 1 and II:
Stage 1 Action: Evaluate alternative structural and operational actions to reduce or prevent fish from straying into the Colusa Basin Drain with low habitat value (CALFED ERPP Volume II, Page 195-196); *Programmatic Action 1A*: Evaluate the feasibility of preventing adult chinook salmon from straying into the Colusa Basin Drain (CALFED ERPP Volume II, Page 195-196); *Mainstem Sacramento River Action #5*: Evaluate and implement alternative structural and operational actions to reduce or prevent fish from straying into the Colusa Basin Drain with low habitat value. The adaptive management consideration for this action is to compare numbers of anadromous fish stranded in

Colusa Drain before and after implementation of various alternatives (CALFED Strategic Plan, Page 65); Additional strategic objectives identified for the fall/late fall-run and winter-run chinook salmon (CALFED ERPP Volume I, Pages 220-223).

Indicate the type of applicant (check only one box):

☐	State agency	☐	Federal agency
☐	Public Non-profit joint venture	☐	Non-profit
☐	Local government/district	☒	Private party
☐	University	☐	Other: _____

Indicate the type of project (check only one box):

☐	Planning	☒	Implementation
☐	Monitoring	☐	Education
☐	Research		

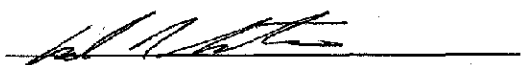
By signing below, the applicant declares the following:

1.) The truthfulness of all representations in their proposal;

2.) The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and

3.) The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

David R. Schuster
Surface Water Resources, Inc.



Signature

Colusa Basin Drain
Adult Salmonid Barrier Project

Submitted By:

David R. Schuster
Surface Water Resources, Inc.
455 Capitol Mall, Suite 600
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Type of Organization: S Corporation
Tax Status: Current
Tax Identification Number: 68-0384309

Co-Sponsor:

Colusa Drain Mutual Water Company

Collaborators/Project Participants:

Hanson Environmental, Inc.
Smith-Root, Inc.
Laugenour and Meikle
Borcalli Associates

April 16, 1999

Executive Summary

The Colusa Basin Drain (CBD) carries agricultural return flows and rainfall runoff from west side Sacramento Valley lands and Coast Range watersheds into the Sacramento River. Flows from the CBD are controlled by gates at the CBD outfall structure near Knights Landing, where water is either released into the Sacramento River or directed through the Knights Landing Ridge Cut (Ridge Cut) and into the Yolo Bypass using the hydraulic gradient created by the operations at the outfall structure.

State and federal agencies have identified concerns regarding the straying of adult salmonids into the CBD due to attraction flows associated with CBD outflow. The concerns focus on the stranding and loss of migrating adult salmonids listed and proposed for listing under the Endangered Species Act (ESA), including fall-run, late fall-run, and winter-run chinook salmon (*Oncorhynchus tshawytscha*). Adult salmonids may become stranded in the CBD with no means of return to the Sacramento River or access to suitable spawning and rearing habitat. A barrier is needed that will prevent the adult salmonids from migrating into the CBD, thereby reducing losses of these special-status fish. Chinook salmon have been identified as high priority target species under both the California and federal ESA and for protection by CALFED.

The project will test the effectiveness of a graduated electrical field barrier for blocking the straying of the adult salmonids into the CBD. In particular, an upstream graduated field barrier system provided by Smith-Root will be used. The tests will be performed over a two-year period at a facility to be installed immediately downstream of the CBD outfall structure near Knights Landing. The effectiveness of the barrier will be monitored and evaluated using multiple methods to provide redundancy and independent confirmation of the test results.

A two-year monitoring program designed to evaluate performance of the electrical barrier has been developed, which will result in an overall assessment of the effectiveness of the electrical field barrier and whether alternatives to the electrical barrier should be further evaluated. The final report will also address considerations for potential electrical field applications in other settings along the Sacramento and San Joaquin rivers, in the Delta, or at other locations where barriers for straying adult salmonids may be warranted. Therefore, the results of the proposed study will have application to attraction flow situations such as at Salt and Mud Slough in the Delta, at sites along the Sacramento River, at sloughs and tributaries in the Suisun Marsh area, and at numerous smaller-scale attraction flow problem areas in marshlands managed for waterfowl and agricultural return flow outfalls throughout the CALFED study region.

The Colusa Drain Mutual Water Company will be the local sponsor for the project. The project team responsible for planning, designing, and implementing the project includes Surface Water Resources, Inc. (SWRI) and Hanson Environmental, Inc. (HEI), Smith-Root, Inc, Laugenour and Meikle, and Borcalli Associates. SWRI will serve as project manager and provide fisheries field and monitoring support to the lead fisheries team member, Dr. Charles Hanson. Smith-Root Inc., a world leader in the application of electrical technology to fishery issues, will provide the upstream graduated field barrier system and operational monitoring and maintenance of the facility. Civil and hydraulic engineering support, construction and operations support, and local knowledge of CBD operations will be provided by Laugenour and Meikle (L&M) and Borcalli Associates (Borcalli).

The ecological and biological objectives of the Project include the following:

- Prevent or reduce straying of special-status salmonids into the CBD, where successful spawning is unlikely;
- Prevent loss of spawning opportunities as a result of the straying salmonids, and thereby contribute to the recovery of the special-status chinook salmon;
- Determine the effectiveness of a graduated electrical field barrier system on the downstream side of the CBD outfall structure; and
- Contribute to the knowledge of electrical field barriers in blocking adult salmonids for potential use at other locations within the Sacramento-San Joaquin river system with similar conditions and fish stressors.

The proposal is directly related to the following actions identified in the ERPP:

- Stage 1 Action: Evaluate alternative structural and operational actions to reduce or prevent fish from straying into the Colusa Basin Drain with low habitat value
- Programmatic Action 1A: Evaluate the feasibility of preventing adult chinook salmon from straying into the Colusa Basin Drain
- Mainstem Sacramento River Action #5: Evaluate and implement alternative structural and operational actions to reduce or prevent fish from straying into the Colusa Basin Drain with low habitat value. The adaptive management consideration for this action is to compare numbers of anadromous fish stranded in Colusa Drain before and after implementation of various alternatives
- The strategic objectives identified in the ERPP for the winter-run and fall/late fall-run chinook salmon.

Local interested parties will include several organizations involved in Colusa Basin Drain water management. These organizations include Colusa Drain Mutual Water Company (local sponsor for this project), Reclamation District 2047, and Colusa Basin Drainage District.

Mr. David Schuster/SWRI has participated in the development of much of the significant water policy in California in recent years, including the historic Bay/Delta Accord that brought federal, state, environmental, agricultural, municipal, and industrial interests to agreement on water quality standards for the San Francisco Bay/Sacramento-San Joaquin Delta estuary. Mr. Rick Lind/SWRI has 20 years experience with CEQA/NEPA regulatory review, resource agency consultations and permit coordination, and construction and operation compliance monitoring programs. Dr. Charles Hanson/HEI has more than 25 years of experience in freshwater biological studies. He has contributed to the study, design, analysis, and interpretation of fisheries, stream habitat, and stream flow (hydraulic) data collected in the evaluation of instream flow requirements and potential fishery impacts on salmonid spawning, production, diversion, and migration success associated with water and hydroelectric development.

The total proposed budget is $577,500. No adverse or third party impacts are anticipated from this project.

Project Description

The Colusa Basin Drain (CBD) carries agricultural return flows and rainfall runoff from west side Sacramento Valley lands and Coast Range watersheds into the Sacramento River. Flows from the CBD are controlled by gates at the CBD outfall structure near Knights Landing, where water is either released into the Sacramento River or directed through the Knights Landing Ridge Cut (Ridge Cut) and into the Yolo Bypass using the hydraulic gradient created by the operations at the outfall structure. **Figure 1** shows the location of these man-made channels.

State and federal agencies have identified concerns regarding the straying of adult salmonids into the CBD due to attraction flows associated with CBD outflow. The concerns focus on the stranding and loss of migrating adult salmonids listed and proposed for listing under the Endangered Species Act (ESA), including fall-run, late fall-run, and winter-run chinook salmon (*Oncorhynchus tshawytscha*). Adult salmonids may become stranded in the CBD with no means of return to the Sacramento River or access to suitable spawning and rearing habitat. A barrier is needed that will prevent the adult salmonids from migrating into the CBD, thereby reducing losses of these special-status fish. Chinook salmon have been identified as high priority target species under both the California and federal ESA and for protection by CALFED.

The special-status salmon have been observed in the CBD, sometimes numbering in the hundreds. Most observations have been at check structures and other barriers used to manage flows within the CBD. USFWS Delevan National Wildlife Refuge managers have reported observing hundreds of adult salmon, in certain years, blocked at flow control structures in the refuge (Lassen 1975 and Frink 1999).

At the CBD outfall structure, culverts with slide gates control the release of water into the Sacramento River at Knights Landing. When higher volumes of outflow coincide with upstream migration, adult salmon are attracted into the CBD. Flows through the CBD into the Sacramento River are greatest (up to a monthly average of 900 cfs) from May through October (**Figure 2**). Adult salmonids could also be entering the CBD through the Yolo Bypass and Ridge Cut (Frink 1999). However, the presence of adults in the CBD in late September and October suggests straying into the CBD through the outfall structure. The Ridge Cut typically has its highest flows (up to a monthly average of 1300 cfs) from December through April. Figure 2 shows the flows from the CBD at the confluence with the Sacramento River and its relationship to the migration periods of the adult salmonid species of focus in this project.

There are different types of barriers that could be used to minimize straying and loss of special-status salmonids in the CBD. CBD water managers indicate that the use of structural barriers may not be viable due to debris build-up and risk of flooding. However, the full range of options has not been examined. Non-structural (behavioral) barriers include light, acoustic and electrical fields. Given the water quality characteristics of the CBD and the recent advances in the use of computer technology for electrical barriers, an electrical field based system is believed to have the greatest potential for reducing and possibly eliminating the attraction and loss of adult salmonids in the CBD.

In the 1970s, an electrical barrier was installed near the CBD outfall structure in an effort to block the upstream movement of adult salmon strays into the CBD. However, the barrier was soon removed due to uncertainties regarding design effectiveness and concerns regarding public safety of that particular design (Cribbs 1990). Since that time, there have been significant advancements in the design and control of electrical field barriers that offer increased flexibility, reliability and safety. These advancements have yielded safe, successful electrical field applications in other areas such as Lake Skinner where the

Figure 1. USGS Quad Detail of Colusa Basin Drain Adult Salmonid Barrier Project Area

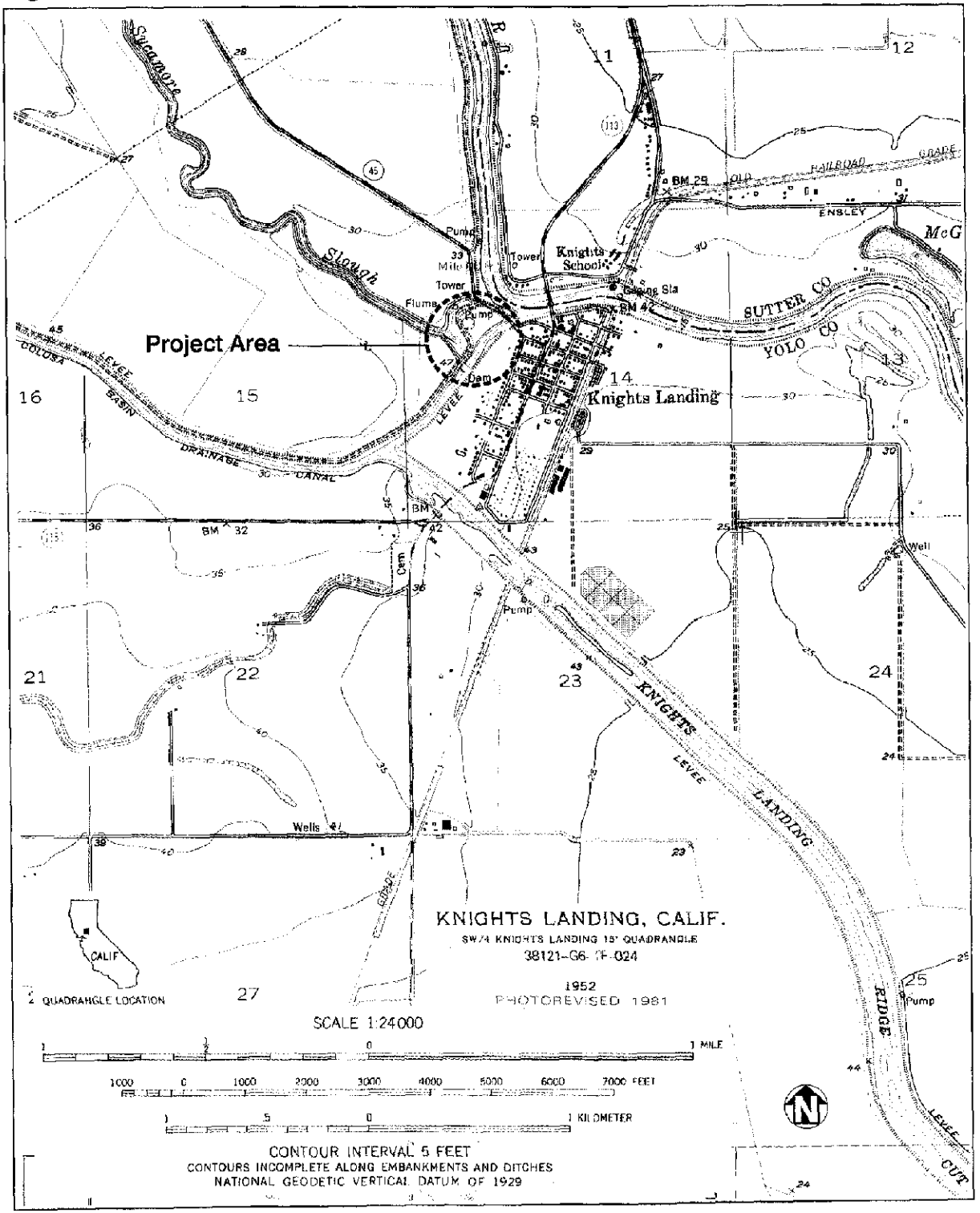

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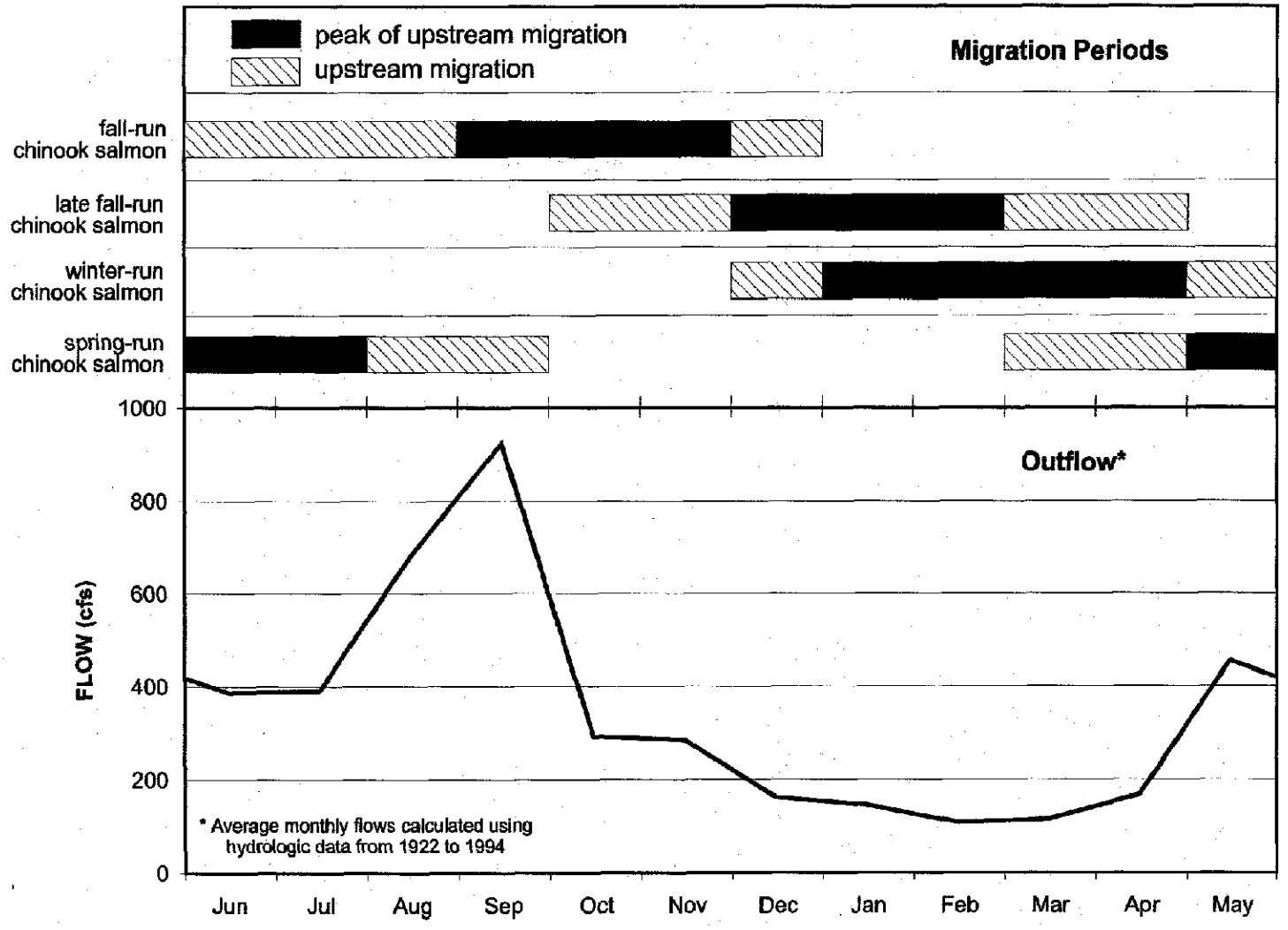
Figure 2. Average Monthly Outflow of the Colusa Basin Drain at Knights Landing and Migration Periods for Target Adult Salmonid Species of the Lower Sacramento River.



Metropolitan Water District of Southern California has kept adult trout and bass from migrating into water supply canals not suited for spawning. Tests conducted by Reclamation District 108 in the early 1990s also showed strong avoidance responses by juvenile chinook salmon exposed to an experimental electrical field at the Feather River hatchery (Hanson and Bemis 1997). However, no tests have been completed to date that address the effectiveness of today's electrical field barriers on migrating adult salmonids.

The Colusa Drain Mutual Water Company will be the local sponsor for the project. A team of fisheries biologists, engineers, and other technical experts from Surface Water Resources, Inc. (SWRI), Hanson Environmental, Inc. (HEI), Laugenour & Meikle, Borcalli Associates, and Smith-Root, Inc. will research, design, implement, and evaluate the project. SWRI will serve as the lead contractor for the project team and will receive local guidance from the Colusa Drain Mutual Water Company and technical input from the remainder of the project team.

The project will test the effectiveness of a graduated electrical field barrier for blocking the straying of the adult salmonids into the CBD. In particular, an upstream graduated field barrier system provided by Smith-Root will be used. The tests will be performed over a two-year period at a facility to be installed immediately downstream of the CBD outfall structure near Knights Landing. **Figure 3** shows approximate location of the proposed barrier system. The effectiveness of the barrier will be monitored and evaluated using multiple methods to provide redundancy and independent confirmation of the test results. Concurrently, alternative concepts for a positive barrier will be developed, reviewed, and evaluated with the Mutual Water Company and resource agencies.

At the end of the two-year evaluation, an overall assessment will be made of the effectiveness of the electrical field barrier and whether alternatives to the electrical barrier should be further evaluated. The final report will also address considerations for potential electrical field applications in other settings along the Sacramento and San Joaquin rivers, in the Delta, or at other locations where barriers for straying adult salmonids may be warranted. Therefore, the results of the proposed study will have application also to attraction flow situations such as at Salt and Mud Slough in the Delta, at sites along the Sacramento River, at sloughs and tributaries in the Suisun Marsh area, and at numerous smaller-scale attraction flow problem areas in marshlands managed for waterfowl and agricultural return flow outfalls throughout the CALFED study region.

Scope of Work. The proposed project will be implemented in three phases. The focus of Phase I will be the development and environmental review of the preliminary design of the electrical field barrier. Phase II will result in the installation of the barrier and Phase III will include the testing, monitoring, and evaluation of the barrier for two years. **Figure 4** shows the anticipated timeline of the phases and tasks.

Phase I - Research, Preliminary Design, and Permits

- Task 1: Conduct data and literature review of the anadromous adult fish passage into the CBD at Knights Landing and the behavioral response of salmonids and other fish species to electrical barriers, hold kick-off meeting, and visit project site
- Task 2: Conduct environmental review and acquire necessary permits and approvals
- Task 3: Develop preliminary design of upstream graduated field barrier system and a project monitoring plan to evaluate its success
- Task 4: Conduct feasibility review of positive barriers as possible alternative to the electrical field barrier

Figure 3. Proposed Location of the Graduated Electrical Field Barrier

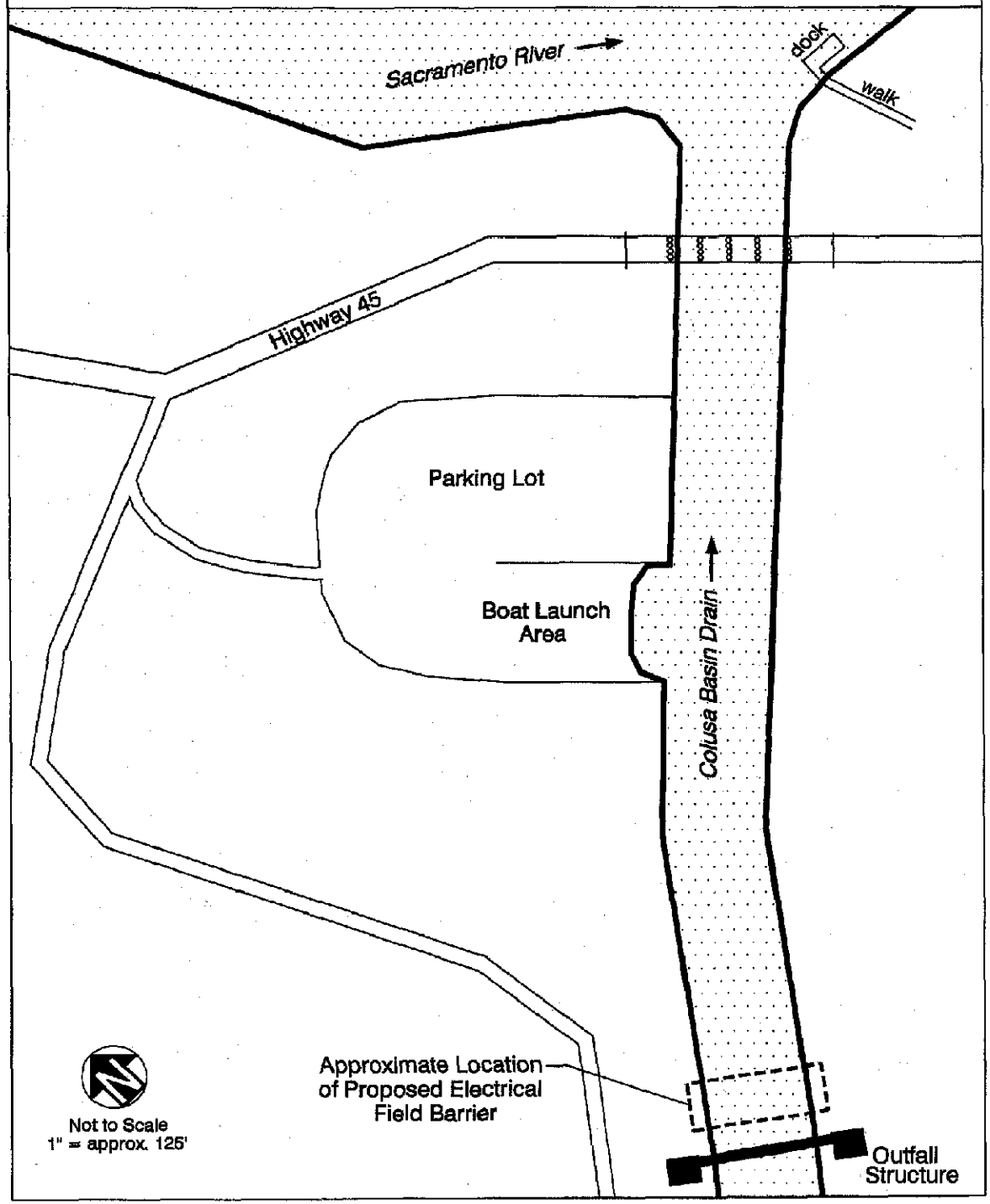


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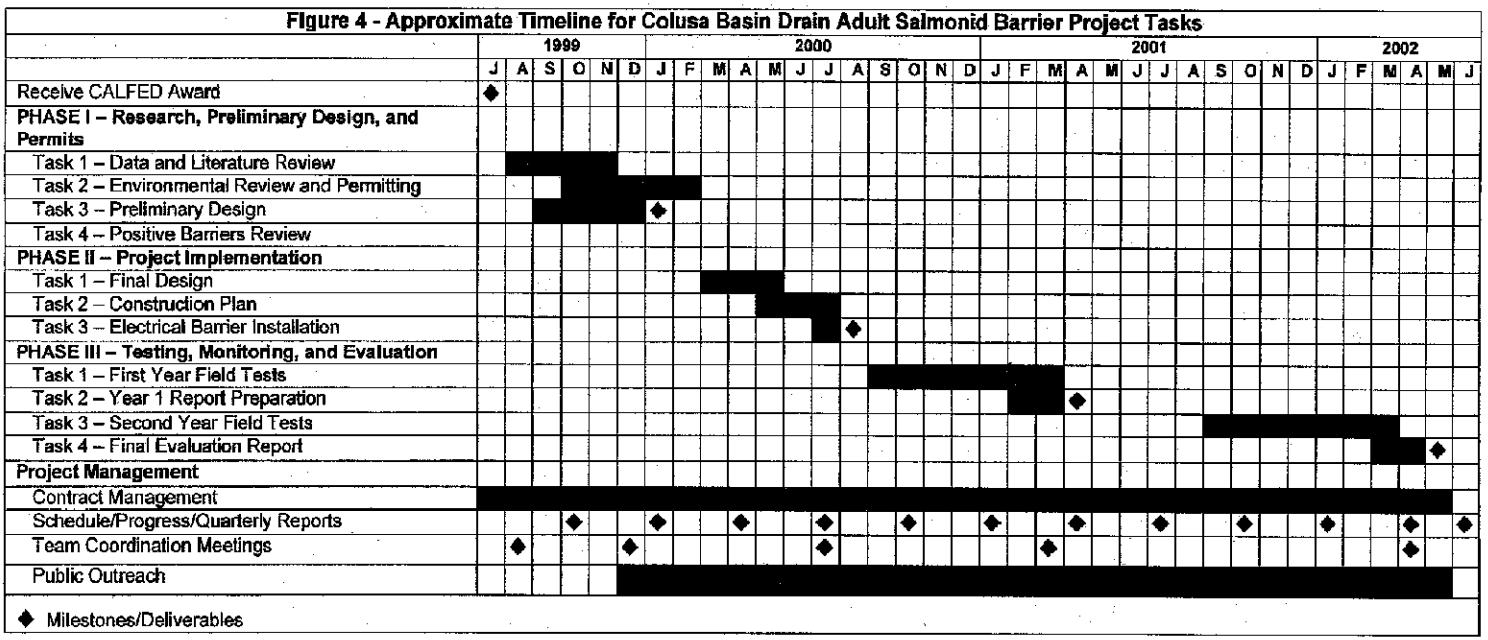
Figure 4 - Approximate Timeline for Colusa Basin Drain Adult Salmonid Barrier Project Tasks



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Phase II - Project Implementation

- Task 1: Prepare detailed design for installation, operation, and maintenance of the selected electrical barrier design
- Task 2: Develop construction management plan for electrical barrier installation
- Task 3: Manage and monitor barrier installation, including any mitigation measures identified during the environmental review process

Phase III - Testing, Monitoring, and Evaluation

- Task 1: Perform field tests of the barrier during the first year of the operation
- Task 2: Prepare technical report which includes study methods, results, and conclusions upon completion of the first year of the evaluation
- Task 3: Perform field tests during the second year of the operation
- Task 4: Prepare project evaluation report which includes the first and second year test results and recommendations regarding a permanent facility

Several methods will be considered for monitoring and evaluating the effectiveness of the barrier. All available methods will be considered and some combination will be selected based on cost, practicality, reliability, and other criteria. These methods could include hydro-acoustic sensors, trapping or netting, fish counters, and observations at upstream barriers within the CBD.

High seasonal turbidity and water depths at the CBD outfall severely limit the ability to rely solely on visual observations of adult fish for evaluating barrier performance. As a result of variability in environmental conditions and salmonid behavior, the evaluation of barrier performance will rely on several independent, but complementary, monitoring techniques. To minimize the possibility that water year conditions could influence the barrier test results, two years of monitoring will be performed. Including two years of study will also provide some flexibility in modifying electrical barrier field strength and configuration depending upon the first year's test results.

Project Management. SWRI would perform project management responsibilities. SWRI would coordinate activities of the project team, track the schedule and budget, manage the subcontracting agreements, and ensure regular communication among the project team. Most of the team members have worked together on prior projects. SWRI will also submit quarterly reports and other deliverables to CALFED. In addition, SWRI will implement the public outreach plan and maintain frequent communication with the local sponsor to coordinate project implementation. The coordination with the Mutual Water Company will help ensure that the project has no adverse effects on CBD operations.

Ecological/Biological Benefits

Project Need. There is a need to reduce the loss of special status salmon species in the CBD. The proposed project would fulfill this need by targeting fall-run/late fall-run chinook salmon which are proposed for listing as threatened under the federal ESA and winter-run chinook salmon which is listed as endangered under both the California and federal ESA. The straying of the adult chinook salmon species into the CBD has long been recognized as a problem (CALFED ERPP Volume 2, Page 196). The straying results from adult anadromous fish following attraction flows entering the Sacramento River. However, there is no spawning habitat in the Colusa Drain, so adults that stray into the drain subsequently become stranded and are lost to the spawning population (CALFED Strategic Plan, Page 65). A barrier is needed to reduce the loss of these species with minimal, if any, disruptions to current water management operations in the CBD.

Structural barriers have long been tested and used to prevent or reduce the loss of fish. In recent decades, the use and effectiveness of fish screens have increased. However, a screen may not be the most feasible option in all cases. Other methods are becoming recognized as alternatives to fish screens. The technology of electrical barriers has progressed significantly in recent years and has combined with computer technology to increase their effectiveness. Opportunities to apply and evaluate electrical and other barriers are needed to further explore the technology applications. The proposed project represents such an opportunity.

Project Objectives. The focus of the proposed project is to provide an immediate remedy for a recognized CALFED stressor on ESA-listed and proposed fish species of the Sacramento River. Specifically, the ecological and biological objectives of the Colusa Basin Drain Adult Salmonid Barrier Project include the following:

- Prevent or reduce straying of special-status salmonids into the CBD, where successful spawning is unlikely;
- Prevent loss of spawning opportunities as a result of the straying salmonids, and thereby contribute to the recovery of the special-status chinook salmon;
- Determine the effectiveness of a graduated electrical field barrier system on the downstream side of the CBD outfall structure; and
- Contribute to the knowledge of electrical field barriers in blocking adult salmonids for potential use at other locations within the Sacramento-San Joaquin river system with similar conditions and fish stressors.

The proposed project would assist CALFED in achieving the Strategic Plan Goal #1 of establishing large, self-sustaining populations of several at-risk species and minimizing the need for future endangered species listings (CALFED Strategic Plan, Page 27). In addition, the project location and physical characteristics provide an opportunity to test a non-structural barrier with no risk of loss of target species above what may be already occurring in the CBD.

Project Benefits. The project would benefit essentially all Sacramento River anadromous fisheries. In particular, this project is anticipated to increase the number of salmon spawning in the Sacramento River and its tributaries. Annual losses of adult salmonids in the CBD probably vary, but are likely in the hundreds, based on observations at Delevan National Wildlife Refuge (Lassen 1975; Frink 1999). With a barrier at the CBD outfall structure, the special-status salmon and steelhead species would be prevented from straying into the drain at this location and would likely increase salmon returns to other parts of the

Sacramento River. Assuming the salmon do locate to other areas to spawn, the project will contribute to the fisheries restoration plans that aim to increase overall numbers of salmonids, such as the Anadromous Fish Restoration Program.

Other benefits derived from the project will be the testing of recent advances in electrical barriers and the development of information for the application of electrical barriers in other areas of the Delta or Sacramento Valley. Circumstances under which an electrical barrier could also be applied include Salt and Mud Slough in the Delta, sites along the Sacramento River, and numerous smaller-scale attraction flow problem areas in marshlands managed for waterfowl throughout the CALFED study area. The conclusions reached through the experiments with the CBD electrical field barrier will be useful in deciding whether to install electrical barriers at these other locations and in the development of the technology.

Project Questions/Hypotheses. The project will examine the effectiveness of the graduated electrical field barrier system on adult salmonids. The question that would be evaluated with implementation of the project is: *Will an electrical field barrier immediately downstream of the CBD outfall structure prevent adult salmonids from straying into the drain?* Related to this objective are specific questions to be answered during the testing and evaluation phase of the project: *Will an effective barrier at the CBD outfall structure prevent adult salmonids from being found at upstream barriers in the CBD? Will a barrier be necessary along other hydraulic pathways leading to the CBD, such as the Knights Landing Ridge Cut?*

The following is a list of questions that the evaluation could also answer regarding the electrical field barrier technology and operation:

- Will the electrical field barrier location at the outfall structure cause the adult migrating salmonids to mill in the stretch of the drain between the outfall structure and the confluence with the Sacramento River? Alternatively, will the migrating salmonids return to the Sacramento River after encountering the electrical barrier at the CBD outfall structure?
- Will the actual electrical field as measured around the barrier match the design barrier field strengths?
- Given the design barrier strengths, does the measured relationship between flow rate and electrical field output deviate from the predicted? Does the measured relationship between salinity and electrical field output deviate from the predicted?

Project Durability. The studies undertaken for this proposal will allow a determination of whether the test facility should be made a permanent installation at the CBD outfall structure. During the testing and monitoring phase, the operations and maintenance activities will be documented. This will allow an estimation of the potential long-term maintenance needs of a barrier system at the outfall structure.

Relationship to Past and Future Projects. A previous effort to prevent salmon from straying into the CBD was not successful. An electrical barrier was installed at the outfall structure in the 1970s. It was later dismantled because of its ineffective design and public safety concerns (Cribbs 1990). Since then, the technology for electrical barriers has been substantially developed and has been combined with computer technology to increase effectiveness and public safety. If during the testing, monitoring, and evaluation phase the electrical field barrier is determined to be ineffective (e.g., adult salmon are observed crossing through the field barrier), then positive barrier screens to be reviewed under Task 4 of Phase I of this proposal could be recommended for further evaluation at the project site.

Relationship to ERP Future Actions and Goals. The proposal is directly related to the following actions identified in the ERPP for the Sacramento River Ecological Management Zone Vision:

- Stage 1 Action: Evaluate alternative structural and operational actions to reduce or prevent fish from straying into the Colusa Basin Drain with low habitat value (CALFED ERPP Volume II, Page 195-196)
- Programmatic Action 1A: Evaluate the feasibility of preventing adult chinook salmon from straying into the Colusa Basin Drain (CALFED ERPP Volume II, Page 195-196)
- Mainstem Sacramento River Action #5: Evaluate and implement alternative structural and operational actions to reduce or prevent fish from straying into the Colusa Basin Drain with low habitat value. The adaptive management consideration for this action is to compare numbers of anadromous fish stranded in Colusa Drain before and after implementation of various alternatives (CALFED Strategic Plan, Page 65)

In addition, this proposal would contribute to the strategic objectives identified in the ERPP for the winter-run and fall/late fall-run chinook salmon (CALFED ERPP Volume I, Page 220-223 and 229).

System-wide Ecosystem Benefits. The project will benefit the salmonid fisheries populations of the Sacramento River system. With prevention measures in place to keep spawning adult salmonids out of the CBD, the number of salmon that successfully reach spawning habitat in the Sacramento River and tributaries will increase.

In addition to the Stage 1 Action identified in the ERPP, the proposed action is also recommended in the AFRP, NMFS Recovery Plan for the Sacramento River Winter-run Chinook Salmon, and the Central Valley Action Plan. **Table 1** lists the recommendations in these fisheries restoration plans that the CBD barrier project will help to implement.

Table 1. Fisheries Restoration Plan Actions Pertaining to the Straying of Salmon into the Colusa Basin Drain.

Management Plan	Action for the Colusa Basin Drain	Priority
Restoring Central Valley Streams: A Plan for Action	Manage agricultural return flows...to control water temperatures in the Sacramento River, and *install barriers to upstream migration.*	A-2[1]
NMFS Proposed Recovery Plan for the Sacramento River Winter-run Chinook Salmon	*Develop and implement corrective measures that prevent or reduce the straying of adult fish to the Colusa Basin Drain . . .*	Priority 1[2]
Draft Restoration Plan for the Anadromous Fish Restoration Program	*Install an adult exclusion device at the Knights Landing outfall for Colusa Basin Drain as an interim action* pending completion of the evaluation of the feasibility of restoring the access of anadromous fish to west side tributaries through development of defined migration routes, sufficient flows, and adequate water temperatures.	Medium

1 Actions designated Priority A-2 in the Central Valley Action Plan are actions having moderate long-term or significant short-term benefits that improve habitat of species that are threatened, endangered, or of special concern.

2 Actions designated Priority 1 in the NMFS Recovery Plan are recognized as actions that must be taken to prevent extinction

Compatibility with Non-Ecosystem Objectives. The proposed project does not conflict with the CALFED objectives related to water quality, water supply reliability, or levee system reliability. The project would not alter water quality. Water supply reliability will not be affected because the electrical field barrier will not interfere with water management of the CBD. Also, levee systems would not be altered. The proposal does not benefit or conflict with any other CALFED programs, such as Water Use Efficiency, Water Transfers, and Watershed Management.

Project Alternatives. A variety of structural and behavior-based barriers were considered for the outfall structure. The Knights Landing Ridge Cut was also considered as a possible location for a barrier. These alternatives were compared qualitatively to assess the most effective type of barrier for the project site. Installation of a fish screen was also considered. However, screens are relatively costly, require complex construction processes, and could result in debris build-up and associated maintenance. Nonetheless, a reconnaissance-level feasibility evaluation of positive barrier alternatives will be performed as a contingency pending the results of the electrical barrier evaluations as noted in the Project Description (Phase I, Task 4). Barriers that rely on fish behavior response to various stimuli were previously considered. Acoustic, light, and air bubble barriers have been tested in a variety of situations to repel fish away from diversion structures. Acoustic barriers have been applied in a few locations, such as at Georgiana Slough, to prevent the entrainment of juvenile salmon. These methods are only partially effective in blocking fish, and the response of the target species should be known prior to testing such devices in the field. These technologies have been shown in a number of investigations to be less effective than electrical barriers.

Compliance with Applicable Environmental Laws, Approvals, and Requirements. The project will be subject to CEQA requirements and, as needed, NEPA review. During Phase I of project implementation, an Initial Study would be prepared. It is anticipated that Reclamation District 2047, Colusa Basin Drainage District, or other local agency may serve as lead agency for compliance with CEQA. Based on the results of the initial study, appropriate environmental and regulatory review processes would be completed. Several permits and agreements may need to be obtained. These may include a Reclamation Board Encroachment Permit, water quality certification from the Central Valley Regional Water Quality Control Board, Streambed Alteration Agreement from the California Department of Fish and Game (CDFG), federal and California ESA consultations with the National Marine Fisheries Service, U.S. Fish and Wildlife Service and CDFG, and consultations with Boating and Waterways and DWR.

Project Constraints. Potential project constraints could arise during the testing and evaluation of the electrical field barrier. The variable nature of salmon migration and flow in the CBD could lead to small sample sizes during the studies of barrier effectiveness and insufficient data in rejecting or accepting the null hypothesis or answering the project questions. Fall-run, late fall-run, and winter-run chinook salmon generally migrate upstream over several months with peaks occurring during a portion of the migration period. The peak of migration can also differ from year to year. The field monitoring will be scheduled to coincide with peak periods of salmonid migration over two years to increase the probability of collecting an adequate sample. The effectiveness of the barrier could vary depending on CBD flow and water quality. Operation of the barrier will be coordinated using on-site monitoring data and computer controls so that the electrical field will remain constant. Safety concerns to adult salmon and wildlife do not constrain the project. The electrical charge of the barrier would be just sufficient to repel adult salmon. Previous studies indicate no injury or mortality will be expected to adult salmon for the proposed electrical field design (e.g., Hilgert 1992).

Human safety is an issue because the project area is near residential land uses and a public boat launch. The barrier design and monitoring will take these concerns into consideration in its operation. The strength of the charge would not pose a danger to boaters and swimmers in the area. Since the electrical barrier would be installed on the CBD outfall structure, and would be marked with warning signs, the potential for contact with boaters and safety risks would be minimal.

Monitoring and Data Collection Methodology

The monitoring program has been developed within an analytical framework to test the hypotheses listed in **Table 2**. To evaluate upstream passage of adult salmonids (Hypothesis 1), outfall culverts will be equipped with a directional fish counting system. The counters continuously monitor changes in electrical conductivity between two probes which detect the passage of adult fish. Probes will be monitored at two locations continuously within each culvert to determine the timing and direction of movement of adult fish. Data from fish counters will be continuously monitored and recorded by an on-site data logger throughout each test period in conjunction with continuous monitoring and data logging of electrical barrier operations. The detection of adult fish passage during periods when the barriers are on would be used to evaluate barrier performance. Null hypothesis 1 would be rejected in the event that no adult fish are detected moving upstream through the outfall during the monitoring period. Data will be analyzed to determine the direction and number of adult fish detected passing through the outfall. Monitoring using traps and/or nets within the CBD, in addition to visual observations during routine surveys at fish passage barriers within the CBD, will also be utilized to evaluate barrier performance and the potential for adult fish movement into the CBD through alternative routes.

The potential for accumulation of adult salmonids immediately downstream of the electrical barrier and CBD outfall (Hypothesis 2) will be assessed through periodic surveys using hydro-acoustic technology and/or boat-mounted fish finders during surveys between the outfall structure and Sacramento River confluence. Surveys will be performed at approximately two-week intervals along established monitoring transects. The number of adult fish identified through acoustic monitoring and their location will be mapped to determine abundance and distribution. Null hypothesis 2 will be rejected in the event there is evidence of the accumulation of adult fish in the area immediately downstream of the CBD outfall.

A recreational angler creel survey will be performed at approximately two-week intervals to assess and quantify angler effort and harvest of adult salmonids within the lower reach of the CBD between the outfall structure and Sacramento River confluence. The angler survey will be stratified to include weekends and weekdays. Null hypothesis 3 will be rejected if angler surveys show increased rates of harvest (CPUE) in the CBD lower reach, compared to a control reach in the immediate vicinity of Knights Landing.

Surveys will be performed immediately downstream of the electrical barrier at approximately two-week intervals using probes to map the strength of the electrical field over a range of environmental conditions. Null hypothesis 4 will be rejected in the event that these measurements show marked differences in the strength of the electrical field among surveys.

Electrical barrier performance will be continuously monitored using the computerized logging system. The data logger will document periods of unscheduled barrier outage. Null hypothesis 5 will be rejected in the event that the frequency and duration of unscheduled outages exceeds 5% of the total test duration.

During the monitoring period, CALFED and other interested parties will be provided with the following reports: (1) annual monitoring reports summarizing quarterly reports and recommending, if any, future actions related to the project; (2) quarterly reports (provided the 10th day of the month following the end of each quarter) showing results of fish surveys and maintenance and operation activities; and (3) final report. The study will also be published and submitted to CALFED, NMFS, USFWS, and CDFG for review. Comments will be incorporated and the final report will be made available to interested resource agencies. The reports will be submitted to CALFED in hard copy and electronic format compatible with MS Access. Monitoring data will be documented and provided to CALFED as part of the final report.

Table 2 Monitoring and Data Collection Information

Biological/Ecological Objectives			
Hypothesis/Question to be Evaluated	**Monitoring Parameter(s) and Data Collection Approach**	**Data Evaluation Approach**	**Comments/Data Priority**
1. Is the electric barrier effective in excluding adult salmonid migration through the CBD outfall? H_O: The electrical barrier is not effective in excluding adult salmonids from migrating upstream into the CBD (e.g., adult salmonids will continue to be observed migrating upstream into the CBD during periods of electrical barrier operation). H_A: The electrical barrier is effective in excluding adult salmonid migration into the CBD (e.g., during periods when the electrical barrier is energized no adult salmonids will be detected passing upstream through the CBD outfall structure).	Continuous directional counting of adult fish passage	Reject null hypothesis if no adult passage into CBD during electrical barrier operation	High
2. Will adult salmonids accumulate downstream of the electrical barrier H_O: Adult salmonids will not congregate or accumulate in the area immediately downstream of the electrical barrier. H_A: Adult salmonids will congregate and accumulate in the area immediately downstream of the electrical barrier rather than continuing migration upstream within the Sacramento River.	Twice-monthly hydro-acoustic and/or boat-mounted fish finder surveys to assess adult abundance and distribution downstream of barrier	Reject null hypothesis if evidence of adult fish accumulation in lower reach of CBD	High

Biological/Ecological Objectives			
Hypothesis/Question to be Evaluated	**Monitoring Parameter(s) and Data Collection Approach**	**Data Evaluation Approach**	**Comments/Data Priority**
3. Are adult salmonids increasingly vulnerable to anger harvest downstream of barrier? H_0: Adult salmonids will not be vulnerable to recreational angler harvest immediately downstream of the electrical barrier and CBD outfall. H_A: Adult salmonids will be harvested by recreational anglers in the area immediately downstream of the CBD outfall.	Twice-monthly recreational angler creel survey (CPUE) for adult salmonids in lower CBD and control reach of Sacramento River	Reject null hypothesis if CPUE within lower reach of CBD is significantly higher than Sacramento River control reach	Moderate
4. Is electrical field gradient consistent over a range of environmental conditions H_0: The electrical field gradient will not be uniform in coverage as a result of variable flow releases from the CBD and water quality parameters. H_A: The electrical field will provide consistent coverage and electrical strength over a wide range of environmental conditions.	Twice-monthly mapping of electrical field strength and measurement of CBD flow and EC	Reject null hypothesis if marked differences in electrical field strength or coverage among surveys	Moderate
5. Is the operational performance of the electrical barrier reliable? H_0: The electrical barrier will experience frequent outages and failures and will not operate on a reliable or consistent basis. H_A: Operation of the electrical barrier will be consistent and reliable throughout the test period.	Continuous monitoring and data logging of barrier operation	Reject null hypothesis if unscheduled barrier outages exceed 5 percent of total test duration	Moderate

I-013342

Local Involvement

County Notification. The Yolo County Planning Department was notified of the project by letter dated April 15, 1999. A copy of the letter was sent to the Yolo County Board of Supervisors.

Local Interested Parties. Local interested parties will include several organizations involved in Colusa Basin Drain water management. These organizations include Colusa Drain Mutual Water Company (local sponsor for this project), Reclamation District 2047, and Colusa Basin Drainage District. Customers served by these entities will likely become interested parties as well. During the environmental review process, special-interest groups from the agricultural and environmental communities may also become local interested parties.

Public Outreach Plan. The project team will prepare a public outreach plan that describes how the local public and recreationists that use the area will be kept informed. The public outreach plan will describe the process and timing for notification of adjacent property owners, local government, sportfishing groups, local conservancies, and the general public. Public outreach will continue during environmental review and monitoring of the barrier system. The plan will include preparation and distribution of a brochure or flyer to regularly update boaters and other recreationists using the public facilities near the project.

Property Use/Access. DWR operates and maintains the CBD outfall structure. Prior to the start of the project, a letter of understanding will be developed to identify the process and conditions for project team access to and use of the project site.

Third Party Effects. No potential adverse effects to third parties have been identified.

Cost

Budget. Cost estimates for implementing the electrical field barrier project are presented in **Table 3** by task as described in the Project Description. **Table 4** provides a quarterly budget breakdown by task. The total proposed budget is $577,500.

Schedule. The anticipated schedule for the project is shown in **Figure 4**. SWRI and the remaining project team members are prepared to initiate work immediately upon execution of a contract with the designated CALFED agency. Assuming CALFED notification of award in July 1999, the project could begin in August 1999 with Phase I tasks, which include literature research, environmental review, and preliminary electrical field barrier design. The preliminary design report is anticipated to be completed and distributed to interested parties and CALFED at the end of January 2000 and the CEQA and other regulatory processes will be completed by March 2000.

Phase II, barrier installation, would begin shortly after completion of the environmental review process. Project construction is anticipated to require approximately 1 month and would be completed in July 2000. Testing, monitoring, and evaluation would be conducted during selected migration periods over two years. A final evaluation report will be submitted to CALFED in May 2002.

Table 3. Total Budget - Colusa Basin Drain Adult Salmonid Barrier Project

Phase/Task	Direct Labor Hours	Direct Salary and Benefits	Service Contracts	Material and Acquisition Costs	Misc. and Other Direct Costs	Overhead and Other Direct Costs	Total
Phase I - Research, Preliminary Design, and Permits							**$100,800**
Task 1 - Data and Literature Review	174	$10,100	$5,600		$200		$15,900
Task 2 - Environmental Review and Permitting	353	$24,900	$4,300		$500		$29,700
Task 3 - Preliminary Design	342	$8,800	$24,000		$500		$33,300
Task 4 - Positive Barriers Review	232	$9,400	$12,000		$500		$21,900
Phase II - Project Implementation							**$166,800**
Task 1 - Final Design	108	$4,300	$6,000		$500		$10,800
Task 2 - Construction Bid Award	84	$2,700	$5,200		$500		$8,400
Task 3 - Barrier Installation	76	$1,200	$6,400	$140,000			$147,600
Phase III - Testing, Monitoring, and Evaluation							**$258,000**
Task 1 - First Year Field Tests	787	$8,200	$67,300	$7,000			$82,500
Task 2 - Year 1 Report Preparation	500	$11,900	$34,000		$500		$46,400
Task 3 - Second Year Field Tests	783	$8,000	$67,300	$7,000			$82,300
Task 4 - Final Evaluation Report	494	$14,300	$32,000		$500		$46,800
Project Management							**$51,900**
Contract Management	280	$19,000			$1,800		$20,800
Schedule/Progress/Quarterly Reports	96	$8,400			$200		$8,600
Team Coordination Meetings	50	$4,000			$1,500		$5,500
Public Outreach	220	$16,000			$1,000		$17,000

Table 4. Quarterly Budget - Colusa Basin Drain Adult Salmonid Barrier Project

Phase/Task	Jul-Sep 1999	Oct-Dec 1999	Jan-Mar 2000	Apr-Jun 2000	Jul-Sep 2000	Oct-Dec 2000	Total
Phase I - Research, Preliminary Design, and Permits							
Task 1 - Data and Literature Review	$7,950	$7,950					
Task 2 - Environmental Review and Permitting		$17,800	$11,900				
Task 3 - Preliminary Design	$8,300	$25,000					
Task 4 - Positive Barriers Review	$6,900	$15,000					
Phase II - Project Implementation							
Task 1 - Final Design			$3,800	$7,000			
Task 2 - Construction Plan				$6,200	$2,200		
Task 3 - Electrical Barrier Installation					$147,600		
Phase III - Testing, Monitoring, and Evaluation							
Task 1 - First Year Field Tests					$27,500	$27,500	
Task 2 - Year 1 Report Preparation							
Task 3 - Second Year Field Tests							
Task 4 - Final Evaluation Report							
Project Management							
Contract Management	$5,800	$1,500	$1,500	$1,500	$1,500	$1,500	
Schedule/Progress/Quarterly Reports	$730	$730	$730	$730	$730	$730	
Team Coordination Meetings	$1,100		$1,100		$1,100		
Public Outreach		$1,000	$1,000	$1,000	$7,000	$1,000	

Table 4. Quarterly Budget - Colusa Basin Drain Adult Salmonid Barrier Project (Continued)

Phase/Task	Jan-Mar 2001	Apr-Jun 2001	Jul-Sep 2001	Oct-Dec 2001	Jan-Mar 2002	Apr-Jun 2002	Total Budget
Phase I - Research, Preliminary Design, and Permits							**$100,800**
Task 1 - Data and Literature Review							$15,900
Task 2 - Environmental Review and Permitting							$29,700
Task 3 - Preliminary Design							$33,300
Task 4 - Positive Barriers Review							$21,900
Phase II - Project Implementation							**$166,800**
Task 1 - Final Design							$10,800
Task 2 - Construction Plan							$8,400
Task 3 - Electrical Barrier Installation							$147,600
Phase III - Testing, Monitoring, and Evaluation							**$258,000**
Task 1 - First Year Field Tests	$27,500						$82,500
Task 2 - Year 1 Report Preparation	$46,400						$46,400
Task 3 - Second Year Field Tests			$27,450	$27,450	$27,400		$82,300
Task 4 - Final Evaluation Report					$23,400	$23,400	$46,800
Project Management							**$51,900**
Contract Management	$1,500		$1,500	$1,500	$1,500	$1,500	$20,800
Schedule/Progress/Quarterly Reports	$730	$570	$730	$730	$730	$730	$8,600
Team Coordination Meetings			$1,100			$1,100	$5,500
Public Outreach	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$17,000

Cost-Sharing

The Colusa Drain Mutual Water Company Engineer will provide input into development of the project design and contribute time in evaluation and report review activities. The purpose of the Company Engineer's participation includes the following:

- Advise SWRI and the other team members on data and information important to the project design and operations;
- Provide coordination for access to CBD facilities, communications with Mutual Water Company customers, as necessary, and liaison with the Board;
- Help ensure that the design and monitoring activities of the project will not interfere with CBD operations; and
- Coordinate Mutual Water Company comments on the draft report and recommendations that will be developed from the test results.

Applicant Qualifications

Project Team. The project team responsible for planning, designing, and implementing the project includes Surface Water Resources, Inc. (SWRI) and Hanson Environmental, Inc. (HEI), Smith-Root, Inc, Laugenour and Meikle, and Borcalli Associates. SWRI will serve as project manager and provide fisheries field and monitoring support to the lead fisheries team member, Dr. Charles Hanson. Smith-Root Inc., a world leader in the application of electrical technology to fishery issues, will provide the upstream graduated field barrier system and operational monitoring and maintenance of the facility. Civil and hydraulic engineering support, construction and operations support, and local knowledge of CBD operations will be provided by Laugenour and Meikle (L&M) and Borcalli Associates (Borcalli).

Responsibilities. The responsibilities of the project team will be as follows:

- Project management (SWRI)
- CEQA and permitting tasks (SWRI)
- Implementing the public outreach plan (SWRI)
- Fisheries studies and monitoring (HEI)
- Electrical field barrier design and operations (Smith-Root, Inc.)
- Civil and hydraulic engineering support, construction and operations support, and local knowledge of CBD operations (Laugenour and Meikle and Borcalli Associates)

Individual Qualifications. The following are brief descriptions of the qualifications and experience of individuals who will be implementing the project. Their roles in this project are also described.

David Schuster - Principal-in-Charge (SWRI) — Mr. Schuster has participated in the development of much of the significant water policy in California in recent years, including the historic Bay/Delta Accord that brought federal, state, environmental, agricultural, municipal, and industrial interests to agreement on water quality standards for the San Francisco Bay/Sacramento-San Joaquin Delta estuary. Mr. Schuster was formerly the Assistant Regional Director for the Mid-Pacific Region of the U.S. Bureau of Reclamation, and General Manager for the State Water Contractors. Mr. Schuster will provide overall management and policy review of project activities.

Rick Lind - Project Manager (SWRI) — Mr. Lind's specialty is in California and federal environmental regulatory compliance, siting and routing evaluations, and agency/public consultations for water and energy-related project development, programs, and permitting. Mr. Lind has 20 years experience with CEQA/NEPA regulatory review, resource agency consultations and permit coordination, and construction and operation compliance monitoring programs. One of his recent accomplishments is the successful completion of environmental regulatory requirements for Glenn-Colusa Irrigation District's fish screen improvement project on the Sacramento River.

Charles Hanson, Ph.D. - Senior Fisheries Biologist (HEI) — Dr. Hanson has more than 25 years of experience in freshwater biological studies. He has contributed to the study, design, analysis, and interpretation of fisheries, stream habitat, and stream flow (hydraulic) data collected in the evaluation of instream flow requirements and potential fishery impacts on salmonid spawning, production, diversion, and migration success associated with water and hydroelectric development. Among these projects, Dr. Hanson has conducted fisheries field studies and stream flow investigations on adult salmonid migration and juvenile rearing. For example, he has conducted fisheries habitat assessments as well as instream flow evaluations and habitat requirement analyses on the Mokelumne River in regard to needs of both steelhead and salmon. He has been extensively involved in the incidental take monitoring and investigations of

endangered species, development of recovery plans, ESA consultations, and preparation of aquatic Habitat Conservation Plans.

Paul Bratovich - Senior Fisheries Biologist (SWRI) — Mr. Bratovich has worked as a fisheries consultant and water resources specialist in California for the past 15 years. Mr. Bratovich has conducted analyses on numerous listed, proposed-listed, and other special-status aquatic species as part of incidental take permit processes, habitat/conservation plans, and watershed management plans. As a recognized fisheries expert, he is actively participating in a broad range of forums in consultative, advisory, and technical expert capacities. His experience includes regulatory and technical consultations with the California Department of Fish and Game, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and other agencies concerning flow-habitat relationships, habitat restoration, population dynamics, and strategic water planning related to salmonid fisheries management.

Mike Bryan - Senior Scientist (SWRI) — Dr. Bryan's expertise is in fisheries biology, aquatic toxicology, aquatic ecology, water quality experimental design and statistical analyses, and ecological risk assessment. He has extensive experience conducting fishery studies, laboratory bioassays, and assessing water quality related impacts to fish and other aquatic organisms. Dr. Bryan is also experienced in assessing impacts to aquatic life at various levels of biological organization, including biochemical, cellular, organismal, population, and community levels. He has additional expertise in assessing impacts to aquatic resources associated with water diversion projects, effluent discharges, and fish screen projects. He also has technical expertise in the areas of water quality, analytical instrumentation, and population dynamics.

Rich Jenness - Professional and Registered Engineer (Laugenour and Meikle) — Mr. Jenness will be responsible for engineering design and construction monitoring. Mr. Jenness serves as district engineer for numerous local and reclamation and irrigation districts, community service districts, and assessment districts in the Sacramento Valley. His expertise includes project planning, engineering, and management for a wide range of agricultural, commercial, industrial, and municipal projects, including levees, wastewater and water systems, drainage, streets, roads, and related infrastructure.

Fran Borcalli (Borcalli & Associates) — Borcalli & Associates is a consulting engineering firm specializing in water resources engineering and resource management. To date, Borcalli & Associates has completed the design and installation of a significant percentage of the fish screens/fish passage facilities implemented under the Anadromous Fish Restoration Program.

Smith-Root, Inc. — Smith-Root, Inc. has been a leader in the design and installation of effective, safe, and reliable products for fisheries conservation for over 30 years. Smith-Root, Inc. manufactures a variety of portable and permanent electrical barriers and associated products the have been successfully installed and operated throughout the United States.

Potential Conflicts of Interest. There are no known conflicts of interest.

Appendix A

Local Involvement and Support Letters

Colusa Drain Mutual Water Company

Yolo County

MURRAY, BURNS AND KIENLEN
A CORPORATION
CONSULTING CIVIL ENGINEERS
1616 20th STREET SUITE 300
SACRAMENTO, CALIFORNIA 95816
TELEPHONE (916) 456-4400
FAX (916) 456-0253

ANGUS NORMAN MURRAY
1913 - 1985

JOSEPH D. COUNTRYMAN, P.E.
GILBERT COSIO, JR., P.E.
MARC VAN CAMP, P.E.

JOHN F. WRIGHT, P.E.
MICHAEL G. ARCHER, P.E.
JEFFREY E. TWITCHELL, P.E.
MARK E. FORTNER, P.E.
DON T. TRIEU
THOMAS R. HICKMANN
TEDDY D. RAMIL

CONSULTANTS:
JOSEPH L. BURNS, P.E.
DONALD E. KIENLEN, P.E.

April 16, 1999

Mr. David R. Schuster, Partner
Surface Water Resources, Inc.
455 Capitol Mall, Suite 600
Sacramento, CA 95814

Subject: CALFED Proposal for an Adult Salmonoid Barrier Project on the Colusa Basin Drain

Dear Dave:

We have had an opportunity to review your letter of April 12, 1999, and the preliminary draft project description for the subject proposal. The Mutual Water Company Board has been following the adult salmon straying issues for some time and agrees that a solution is needed. This letter is to confirm the Mutual Water Company's interest in serving as a local sponsor of the project.

As mentioned in your letter, our office, as Company Engineer, will be available to advise SWRI and the other team members on data and information important to the project and help ensure that the design and monitoring activities of the project will not interfere with operations of the Colusa Drain. We will provide coordination for access to facilities and communications with Mutual Water Company customers. We will also review draft reports and provide comments on recommendations to be developed from the test results.

If you would like to discuss our participation further, please feel free to contact me at 916/456-4400. Otherwise, we are hopeful that CALFED will consider this a valuable step toward solving the salmon straying problems in the Colusa Drain.

Sincerely,
MURRAY, BURNS & KIENLEN
COLUSA DRAIN MUTUAL WATER COMPANY
ENGINEERING CONSULTANT

Marc Van Camp

MVC/mv
mve\L0416991

Enclosure

cc: Bob Wallace
Doug McGeoghegan
Jamie Traynham
George Basye

SWRI SURFACE WATER RESOURCES, INC.

April 15, 1999

Mr. John Bencomo
Assistant Director of Planning and Public Works
Yolo County Planning Department
292 West Beamer Street
Woodland, CA 95695

Subject: Proposal to CALFED for Colusa Basin Drain Adult Salmon Barrier Project

Dear Mr. Bencomo:

The CALFED Bay-Delta Program recently issued a solicitation for proposals for ecosystem restoration projects to improve the health of the Bay-Delta ecosystem. Surface Water Resources, Inc. (SWRI) plans to submit a proposal to CALFED for the subject project. The primary goal of the project is to prevent adult chinook salmon that are listed or proposed for listing under the Endangered Species Act from straying into the Colusa Basin Drain. This project would implement an action that has been recommended in several fisheries restoration plans, such as the Anadromous Fish Restoration Program, National Marine Fisheries Service Proposed Recovery Plan, and CALFED Ecosystem Restoration Program Plan.

The Adult Salmon Barrier Project would involve the installation and testing of an electrical field barrier at the outfall structure near Knights Landing. Studies of the electrical barrier effectiveness would be conducted over a two-year period.

If we receive CALFED approval, we will be contacting Yolo County to discuss our plans and the anticipated schedule for project implementation. Please feel free to contact me at (916) 325-4050 with any questions.

Sincerely,

SURFACE WATER RESOURCES, INC.

David R. Schuster
Partner

Enclosure

cc: Yolo County Board of Supervisors
Marc Van Camp, Colusa Drain Mutual Water Company

455 Capitol Mall • Suite 600 • Sacramento, California 95814
Tel: (916) 325-4050 • FAX: (916) 446-0143 • E-mail: swri@ix.netcom.com

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Appendix B

Required State and Federal Forms

Nondiscrimination Compliance Statement

Standard Form 424 - Application for Federal Assistance

Standard Form 424C Budget Information

Standard Form 424D Assurances Construction Programs

Certifications Regarding Debarment, Suspension and Other Responsibility Matters, Drug-Free Workplace Requirements and Lobbying

I-013355

STATE OF CALIFORNIA

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (REV. 3-95) FMC

COMPANY NAME: Surface Water Resources, Inc.

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME: David R. Schuster

DATE EXECUTED: 4-16-99

EXECUTED IN THE COUNTY OF: Sacramento

PROSPECTIVE CONTRACTOR'S SIGNATURE:

PROSPECTIVE CONTRACTOR'S TITLE: Partner

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME: Surface Water Resources, Inc

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I-013356

APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

2. DATE SUBMITTED	Applicant Identifier
4/16/99	
3. DATE RECEIVED BY STATE	**State Application Identifier**
4. DATE RECEIVED BY FEDERAL AGENCY	**Federal Identifier**

1. TYPE OF SUBMISSION:

Application	Preapplication
☒ Construction	☐ Construction
☐ Non-Construction	☐ Non-Construction

5. APPLICANT INFORMATION

Legal Name: Surface Water Resources, Inc.

Organizational Unit:

Address *(give city, county, State, and zip code):* 455 Capitol Mall, Suite 600 Sacramento, CA 95814

Name and telephone number of person to be contacted on matters involving this application *(give area code)* David R. Schuster (916) 325-4050

6. EMPLOYER IDENTIFICATION NUMBER *(EIN):* 68-0384309

7. TYPE OF APPLICANT: *(enter appropriate letter in box)* M

A. State — H. Independent School Dist.
B. County — I. State Controlled Institution of Higher Learning
C. Municipal — J. Private University
D. Township — K. Indian Tribe
E. Interstate — L. Individual
F. Intermunicipal — M. Profit Organization
G. Special District — N. Other (Specify) _____

8. TYPE OF APPLICATION:

☒ New ☐ Continuation ☐ Revision

If Revision, enter appropriate letter(s) in box(es) ☐ ☐

A. Increase Award B. Decrease Award C. Increase Duration
D. Decrease Duration Other *(specify):*

9. NAME OF FEDERAL AGENCY: CALFED

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: ☐☐-☐☐☐

TITLE: N/A

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Colusa Basin Drain Adult Salmon Barrier Project

12. AREAS AFFECTED BY PROJECT *(Cities, Counties, States, etc.):* Yolo County

13. PROPOSED PROJECT		14. CONGRESSIONAL DISTRICTS OF:	
Start Date	Ending Date	a. Applicant 3-5, 11	b. Project 3

15. ESTIMATED FUNDING:

a. Federal	$ .00
b. Applicant	$ .00
c. State	$ .00
d. Local	$ .00
e. Other	$ .00
f. Program Income	$ .00
g. TOTAL	$ 577,500 .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS? N/A

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE _____

b. No. ☐ PROGRAM IS NOT COVERED BY E. O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

☐ Yes If "Yes," attach an explanation. ☒ No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title	c. Telephone Number
David R. Schuster	Partner	916/325-4050
Signature of Authorized Representative		**e. Date Signed**
		4-16-99

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Authorized for Local Reproduction

Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

I -013357

I-013357

INSTRUCTIONS FOR THE SF-424

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

This is a standard form used by applicants as a required facesheet for preapplications and applications submitted for Federal assistance. It will be used by Federal agencies to obtain applicant certification that States which have established a review and comment procedure in response to Executive Order 12372 and have selected the program to be included in their process, have been given an opportunity to review the applicant's submission.

Item:	Entry:
1.	Self-explanatory.
2.	Date application submitted to Federal agency (or State if applicable) and applicant's control number (if applicable).
3.	State use only (if applicable).
4.	If this application is to continue or revise an existing award, enter present Federal identifier number. If for a new project, leave blank.
5.	Legal name of applicant, name of primary organizational unit which will undertake the assistance activity, complete address of the applicant, and name and telephone number of the person to contact on matters related to this application.
6.	Enter Employer Identification Number (EIN) as assigned by the Internal Revenue Service.
7.	Enter the appropriate letter in the space provided.
8.	Check appropriate box and enter appropriate letter(s) in the space(s) provided: – "New" means a new assistance award. – "Continuation" means an extension for an additional funding/budget period for a project with a projected completion date. – "Revision" means any change in the Federal Government's financial obligation or contingent liability from an existing obligation.
9.	Name of Federal agency from which assistance is being requested with this application.
10.	Use the Catalog of Federal Domestic Assistance number and title of the program under which assistance is requested.
11.	Enter a brief descriptive title of the project. If more than one program is involved, you should append an explanation on a separate sheet. If appropriate (e.g., construction or real property projects), attach a map showing project location. For preapplications, use a separate sheet to provide a summary description of this project.
12.	List only the largest political entities affected (e.g., State, counties, cities).
13.	Self-explanatory.
14.	List the applicant's Congressional District and any District(s) affected by the program or project.
15.	Amount requested or to be contributed during the first funding/budget period by each contributor. Value of in-kind contributions should be included on appropriate lines as applicable. If the action will result in a dollar change to an existing award, indicate *only* the amount of the change. For decreases, enclose the amounts in parentheses. If both basic and supplemental amounts are included, show breakdown on an attached sheet. For multiple program funding, use totals and show breakdown using same categories as item 15.
16.	Applicants should contact the State Single Point of Contact (SPOC) for Federal Executive Order 12372 to determine whether the application is subject to the State intergovernmental review process.
17.	This question applies to the applicant organization, not the person who signs as the authorized representative. Categories of debt include delinquent audit disallowances, loans and taxes.
18.	To be signed by the authorized representative of the applicant. A copy of the governing body's authorization for you to sign this application as official representative must be on file in the applicant's office. (Certain Federal agencies may require that this authorization be submitted as part of the application.)

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[redacted]

OMB Approval No. 0348-0041

BUDGET INFORMATION -- Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case you will be notified.

	COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Column a-b)
1.	Administrative and legal expenses	$ 34,900	$	$ 34,900
2.	Land, structures, rights-of-way, appraisals, etc.	$	$	$
3.	Relocation expenses and payments	$	$	$
4.	Architectural and engineering fees	$ 120,000	$	$ 120,000
5.	Other architectural and engineering fees	$ 258,000	$	$ 258,000
6.	Project inspection fees	$	$	$
7.	Site work	$	$	$
8.	Demolition and removal	$	$	$
9.	Construction	$ 147,600	$	$ 147,600
10.	Equipment	$	$	$
11.	Miscellaneous (Public Outreach)	$ 17,000	$	$ 17,000
12.	SUBTOTAL	$	$	$
13.	Contingencies	$	$	$
14.	SUBTOTAL	$	$	$
15.	Project (program) income	$	$	$
16.	TOTAL PROJECT COSTS (subtract #15 from #14)	$ 577,500	$	$ 577,500
17.	Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share). Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 100 %		$ 577,500

Previous Edition Usable

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I-013359

ASSURANCES -- CONSTRUCTION PROGRAMS

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States, and if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will not dispose of, modify the use of, or change the terms of the real property title, or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal interest in the title of real property in accordance with awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.

4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.

5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progress reports and such other information as may be required by the assistance awarding agency or State.

6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. Secs. 4728-4763) relating to prescribed standards for merit systems for programs funded under one of the nineteen statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. Secs. 4801 et seq.) which prohibits the use of lead based paint in construction or rehabilitation of residence structures.

10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. Secs. 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. Secs. 794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. Secs. 6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) Secs. 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. Secs. 3601 et seq.), as amended, relating to non-discrimination in the sale, rental or financing of housing; (i) any other non-discrimination provisions in the specific statute(s) under which application for Federal assistance is being made, and (j) the requirements of any other non-discrimination Statute(s) which may apply to the application.

11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provides for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

12. Will comply with the provisions of the Hatch Act (5 U.S.C. Secs. 1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

13. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. Secs. 276a to 276a - 7), the Copeland Act (40 U.S.C. Secs. 276c and 18 U.S.C. Sec. 874), the Contract Work Hours and Safety Standards Act (40 U.S.C. Secs. 327-333), regarding labor standards for federally assisted construction subagreements.

14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. Secs. 1451 et seq.); (f) conformity of Federal actions to State (Clear Air) Implementation Plans under Section 176(c) of the Clear Air Act of 1955, as amended (42 U.S.C. Secs. 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended, (P.L. 93-523); and (h) protection of endangered species under the Endangered Species Act of 1973, as amended, (P.L. 93-205).

16. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. Secs. 1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

17. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec. 470), EO 11593 (identification and preservation of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).

18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act of 1984.

19. Will comply with all applicable requirements of all other Federal laws, Executive Orders, regulations and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
[signature]	Partner
APPLICANT ORGANIZATION	DATE SUBMITTED
Surface Water Resources, Inc.	4/16/99

SF 424D (Rev. 4/92) Back

I-013361

I-013361

U.S. Department of the Interior

Certifications Regarding Debarment, Suspension and Other Responsibility Matters, Drug-Free Workplace Requirements and Lobbying

Persons signing this form should refer to the regulations referenced below for complete instructions:

Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions - **The prospective primary participant further agrees by submitting this proposal that it will include the clause titled, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.** See below for language to be used; use this form for certification and sign; or use Department of the Interior Form 1954 (DI-1954). (See Appendix A of Subpart D of 43 CFR Part 12.)

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions - (See Appendix B of Subpart D of 43 CFR Part 12.)

Certification Regarding Drug-Free Workplace Requirements - Alternate I. (Grantees Other Than Individuals) and Alternate II. (Grantees Who are Individuals) - (See Appendix C of Subpart D of 43 CFR Part 12)

Signature on this form provides for compliance with certification requirements under 43 CFR Parts 12 and 18. The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of the Interior determines to award the covered transaction, grant, cooperative agreement or loan.

PART A: Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions

CHECK ✓ IF THIS CERTIFICATION IS FOR A PRIMARY COVERED TRANSACTION AND IS APPLICABLE.

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

PART B: Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

CHECK ✓ IF THIS CERTIFICATION IS FOR A LOWER TIER COVERED TRANSACTION AND IS APPLICABLE.

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

DI-2014
March 1998
[This form consolidates DI-1953, DI-1954,

PART C: Certification Regarding Drug-Free Workplace Requirements

CHECK ✓ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS NOT AN INDIVIDUAL.

Alternate I. (Grantees Other Than Individuals)

A. The grantee certifies that it will or continue to provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing an ongoing drug-free awareness program to inform employees about–
(1) The dangers of drug abuse in the workplace;
(2) The grantee's policy of maintaining a drug-free workplace;
(3) Any available drug counseling, rehabilitation, and employee assistance programs; and
(4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will –
(1) Abide by the terms of the statement; and
(2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification numbers(s) of each affected grant;

(f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted –
(1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a) (b), (c), (d), (e) and (f).

B. The grantee may insert in the space provided below the site(s for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

455 Capitol Mall, Suite 600
Sacramento CA 95814

Check___if there are workplaces on file that are not identified here.

PART D: Certification Regarding Drug-Free Workplace Requirements

CHECK__IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS AN INDIVIDUAL.

Alternate II. (Grantees Who Are Individuals)

(a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant;

(b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, he or she will report the conviction, in writing, within 10 calendar days of the conviction, to the grant officer or other designee, unless the Federal agency designates a central point for the receipt of such notices. When notice is made to such a central point, it shall include the identification number(s) of each affected grant.

I-013363

PART E: **Certification Regarding Lobbying**
Certification for Contracts, Grants, Loans, and Cooperative Agreements

CHECK ✓ IF CERTIFICATION IS FOR THE AWARD OF ANY OF THE FOLLOWING AND THE AMOUNT EXCEEDS $100,000: A FEDERAL GRANT OR COOPERATIVE AGREEMENT; SUBCONTRACT, OR SUBGRANT UNDER THE GRANT OR COOPERATIVE AGREEMENT.

CHECK __ IF CERTIFICATION IS FOR THE AWARD OF A FEDERAL LOAN EXCEEDING THE AMOUNT OF $150,000, OR A SUBGRANT OR SUBCONTRACT EXCEEDING $100,000, UNDER THE LOAN.

The undersigned certifies, to the best of his or her knowledge and belief, that:

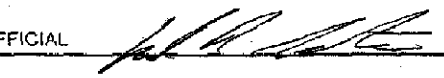
(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

As the authorized certifying official, I hereby certify that the above specified certifications are true.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL 

TYPED NAME AND TITLE David R. Schuster

DATE April 16, 1999

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I-013364

Appendix C

Literature Cited In the Proposal

I-013365

Literature Cited

Cribbs, Harold C., Executive Secretary, California Fish and Game Commission. February 7, 1990 letter to Charles Michael of Reclamation District No. 2047.

Frink, Ted, Environmental Services, Department of Water Resources. March 1, 1999. Telephone conversation with M. Kim of SWRI.

Hanson and Bemis 1997. Guidance Efficiency of a Flow Distribution System - Electrical Barrier - in Reducing Juvenile Chinook Salmon Entrainment at the Reclamation District 108, Wilkins Slough Diversion: 1996 Field Studies and Evaluation. Prepared for Reclamation District 108.

Hilgert, Phil J., Beak Consultants Incorporated. May 1992. Evaluation of a Graduated Electric Field as a Fish Exclusion Device. Prepared for the Puget Sound Power and Light Company.

National Marine Fisheries Service (NMFS). August 1997. NMFS Proposed Recovery Plan for the Sacramento River Winter-run Chinook Salmon.

Reynolds, Forrest L. T.J. Mills, R. Benthin, and A. Low. November 1993. Restoring Central Valley Streams: A Plan for Action.

U.S. Fish and Wildlife Service (USFWS). May 30, 1997. Revised Draft Restoration Plan for the Anadromous Fish Restoration Program.